Appendix B

Information Needs

I. Introduction

This appendix identifies priority research important for further forest plan amendment or revision and lists additional data and information needs that will help to implement the Tongass National Forest Land and Resource Management Plan. While not essential to the completion of this Revision, results of the priority research items, prior to completion of the next revision of the forest plan, will substantially strengthen the scientific information base needed to support alternative development. An important element of the priority research items and additional information needs is an "adaptive management" feed-back loop to evaluate current plan direction, design monitoring programs to measure effects, and adjust future management activities to better address economic, social, and environmental concerns on the Tongass National Forest. As a part of this process, statistically sound sampling design and analysis techniques need to be developed to assure reliability of monitored data and interpretations. This additional research component will be important to maintaining the scientific creditability of the plan.

The appendix also recognizes additional information needs which, when filled, will be useful for Plan implementation at the project level. A few of the identified and listed data and inventory items needed to further improve the information base overlap with the planned and ongoing validation and effectiveness monitoring specified in the Monitoring and Evaluation Plan (see Chapter 6 of the Tongass Land Management Plan). Funding for some items are already included in Forest or Regional budgets. Additional funding will vary depending on the resource emphasis and needs in any given year.

II. Priority Research Needs

With the assistance of planning team scientists, and considering input from other Federal agencies, state and local governments and universities, and other public comment, ten priority research needs have been identified. Each of the needs will be addressed within the next several years through an accelerated research program carried on by Pacific Northwest Research Station research scientists and through other cooperative research within and outside of the Forest Service.

These priority research needs, with objectives, estimated costs, and duration, are listed in order of priority:

1. TIMBER PRODUCTIVITY AND RESPONSE TO HARVEST OF FORESTED WETLANDS IN SOUTHEAST ALASKA

Objectives: a) Examine the response of forested wetlands following timber harvest on Kaikli, Karheen, Kitkun, and Maybeso Series soils and a Lithic Cryosaprist soil; b) document the effects of timber harvest on stocking (tree numbers, species, distribution) and growth response (timber volume).

Estimated cost: $270,000.00
Duration: 3 years

2. DETERMINE THE RELATIONSHIP BETWEEN SOCIOECONOMIC CONDITIONS IN RURAL COMMUNITIES AND RESOURCE ALLOCATIONS ON THE TONGASS NATIONAL FOREST

Objectives: a) Develop baseline data to better identify the social and economic conditions within Southeast Alaska communities. These conditions include perceived needs and desires of local residents as well as basic social and economic trends; b) determine linkages between resource allocations and social and economic conditions in Southeast Alaska communities on the Tongass National Forest; c) test the applicability of current social and economic models to Southeast Alaska communities; and, d) determine effects of National Forest planning decisions (TLMP) on these community-level conditions and desires, focusing on changes related to plan implementation.

Estimated cost: $250,000.00
Duration: 3 years

3. DETERMINE SUBSISTENCE RESOURCE PATTERNS IN SOUTHEAST ALASKA

Objectives: a) Update community traditional resource use patterns survey (TRUCS) through a series of community self-assessment surveys integrating standard scientific methodologies and traditional environmental knowledge; b) Identify and monitor ongoing subsistence needs and uses through available data [e.g. Alaska Department of Fish and Game (ADF&G) surveys] and the process outlined in a) above.

Estimated cost: $250,000.00
Duration: 3 years

4. IDENTIFY AND MEASURE THE INTERACTIONS BETWEEN AQUATIC/RIPARIAN HABITAT AND PERTURBATIONS IN UPLAND AREAS AND THE RESPONSE OF ANADROMOUS AND RESIDENT SALMONIDS

Objectives: a) Systematically evaluate existing habitat and its relationship to salmonid populations in old-growth (unmanaged watersheds) and managed watersheds (logged watersheds); b) evaluate interactions between aquatic habitat, salmonid productivity, and geomorphic processes in stream channels and in watersheds; c) evaluate the effects of land management activities on geomorphic processes in high gradient channels and on downstream aquatic habitat; d) further develop the fish habitat objectives system used to measure changes in the natural range and frequency of aquatic habitat conditions.

Estimated cost: $400,000.00
Duration: 5 years

5. DETERMINE THE GEOGRAPHIC AND HABITAT DISTRIBUTION OF ENDEMIC MAMMALS ON THE TONGASS NATIONAL FOREST

Objectives: a) For several recognized mammalian taxa with limited historical ranges, continue to document geographic extent and habitat distribution within and across islands and the mainland portion of the Tongass National Forest; b) determine population levels and associated distribution of mammalian endemics on islands and portions of the mainland that have had timber harvest.

Estimated total cost: $485,000.00
Duration: 5 years

6. EVALUATE THE FUTURE TIMBER PRODUCTIVITY OF YOUNG-GROWTH STANDS ON THE TONGASS NATIONAL FOREST

Objectives: a) Conduct baseline studies on the future timber productivity of young-growth stands including distribution of site indexes, modeling (SEAPROG) routines, stem quality, intermediate treatments, harvesting standards, and alternative harvest systems; b) evaluate these factors in terms of future timber production projections on the Tongass National Forest; and c) evaluate the influence of these factors on restoration and enhancement of deer and other wildlife habitat.

Estimated cost: $250,000.00
Duration: 3 years

7. EVALUATE ALTERNATIVES TO CLEARCUT TIMBER HARVEST ON THE TONGASS NATIONAL FOREST

Objectives: a) Conduct baseline studies on the effects of alternative silvicultural, logging, and regeneration systems on the ecology of late-successional commercial forest stands; b) evaluate the effectiveness, operability, costs, and ability to meet management needs and social desires of these alternatives; and c) determine the influence of alternative silvicultural systems on restoration and enhancement of deer and other wildlife habitat.

Estimated cost: $500,000.00
Duration: 5 years

8. DETERMINE ALASKA TIMBER PRICES AND MARKET ARBITRAGE IN THE PACIFIC NORTHWEST

Objectives: a) Examine the relationship between timber prices in Alaska (sold price, Tongass NF) and timber prices in the Pacific Northwest; b) describe factors common to both markets, and factors unique to each market; c) review statistical models that forecast the price of timber sold in Alaska (Tongass NF); d) based on this review, revise existing models, or develop new models that can forecast Alaska prices as a function of explanatory factors for which forecast values are available.

Estimated cost: $10,875.00
Duration: 6 months

9. DETERMINE PRICES AND COSTS IN ALASKA TIMBER PRODUCTION AND PRODUCT SUPPLY

Objectives: a) Compile data and assess patterns and trends in key factors that determine competitiveness in forest products industries; compare data for Alaska to that for the Pacific Northwest, Canada, and major overseas competitors; b) conduct a preliminary analysis to estimate export supply relationships for Alaska, to determine the change in quantity exported in response to changes in export and domestic prices, costs, exchange rates, and other factors; c) review the data from the Tongass NF on logging costs and timber availability; if possible, develop a preliminary method to incorporate these data in projections of demand for Tongass NF timber.

Estimated cost: $40,750.00
Duration: 12 months

10. STUDY LUMBER RECOVERY OF SECOND GROWTH TIMBER FROM SOUTHEAST ALASKA

Objectives: a) Conduct a baseline lumber recovery study on second-growth western hemlock and Sitka spruce from Southeast Alaska. This will provide estimates of the timber volume, lumber volume by grade, and lumber value recovery by diameter class and species; b) evaluate the characteristics of second-growth timber (wood density, juvenile wood, etc.) for their significance in the product potential of trees from Southeast Alaska.

Estimated cost: $41,670.00
Duration: 12 months

III. Additional Information Needs

The items listed in this section define a number of information needs identified by resource specialists on the Tongass, considering input from within the Forest Service, other Federal agencies, state and local governments and universities, and the public comment. Filling these needs may considerably improve the knowledge base on which the next Revision is developed and on which this plan is implemented.

A. **AIR**

1. Determine air quality conditions on Tongass National Forest lands (Consult FSM 2580).
2. Assess and document the potential effects, if any, of air pollution on forest resources.
3. Assess use of lichens as indicators of forest health and air quality conditions.
4. Establish the role and contribution of lichens to the fixed nitrogen supply available for nutrient cycling in forest ecosystems.
5. Develop seasonal surface and aloft airflow (wind) maps.
6. In order to help understand global warming, basic research is needed to better understand the productivity potential (in the sense of carbon utilization) of the full range of temperate rain forest sites, and to better predict what impact land-use practices may have on atmospheric carbon.

B. **FISH**

1. Continue to maintain and update channel type and stream class inventories.
2. Continue to inventory aquatic habitats for fish improvement opportunities.
3. Determine success, in terms of habitat capability and numbers of fish, of fish improvement projects.
4. Develop a model using channel types to indicate potential locations for stream improvement.
5. Develop a lake classification system which complements the channel type inventory.
6. Collect information to validate or change habitat management standards and guidelines for streams, lakes, and estuaries. Information which might be needed includes: use of, and interactions between, coho, sockeye and cutthroat trout; cumulative effects from upstream influences; and, nutrient cycling resulting from salmon spawning.

7. Continue to address the information needs identified by the Alaska Cooperative Working Group on Forestry/Fisheries Research (Alaska Working Group on Cooperative Forestry/Fisheries Research, Information Document 91-02, 1991). These include:
   a. Determine the downstream effects of forest management activities including road construction, streams crossings, and riparian vegetation removal on water quality, stream flow, and fish habitat;
   b. Assess the effectiveness of restoration efforts in increasing habitat and fish production;
   c. Define the various riparian functions important to fish and wildlife in Southeast Alaska;
   d. Determine how to design buffer strips to minimize blowdown;
   e. Develop appropriate techniques and parameters for rapid bio-assessment (such as indicator species) for monitoring cumulative effects.

8. Better understand the interaction and effect of introduced fish on resident fish, especially above major barriers where there may be unique populations of cutthroat trout or Dolly Varden char, to better predict the potential impacts of fish improvement projects.

9. Learn more about the genetics of wild stocks of fish which our management activities may affect, to know whether stocks have unique attributes.

10. Learn why, among the islands of Southeast Alaska, only Admiralty Island (King Salmon River & Wheeler Creek) has endemic stocks of chinook (king) salmon.

11. Acquire information on the biological, geological, and hydrological functions and processes occurring at the watershed scale which define the natural range of variation of fish habitat conditions.

12. Acquire information on the efficacy of watershed restoration in increasing fish habitat and production.

13. Determine if there is a relationship between harvest practices in watersheds and the rate of lateral migration of distributary streams in estuaries.

14. Using aerial photo data, determine whether there exists a correlation between historic harvest activity and significant changes in distributary channel distribution.

C. HERITAGE RESOURCES

1. Document all discovered sites and maintain a current automated database in conjunction with Alaska Heritage Resource Surveys (AHRS).

2. Develop a comprehensive compilation of known cultural resources information in overview form which provides a description, status and management data for decisions.

3. Land Use:
   a. Develop correlations between landform class and cultural site type and determine whether this relationship changes with time;
   b. Develop a predictable, village-based spatial pattern of use that can be used to model communities.

4. Early Peopling of North America:
   a. Determine if the southward migration of coastally adapted people was responsible, in any part, for the first human occupation of the Americas;
   b. Determine if archaeological sites representing human occupation prior to 9,500 BP existed in Southeast Alaska;
   c. Determine if early, coastally adapted hunter/gatherer groups ventured inland in search of terrestrial resources;
   d. Determine if the extensive littoral and solution cave systems of Southeast Alaska were utilized for shelter and other cultural purposes during the late Pleistocene and early Holocene.

5. Paleoenvironmental Reconstruction:
   a. Identify the location of the shoreline at different points in the past (e.g. 17,000 BP, 14,000 BP, 10,000 BP, 8,000 BP, 6,000 BP, 5,000 BP);
   b. Define the rate, and variations in rate, of sea level change during the late Pleistocene and Holocene;
   c. Determine how the forest plant community composition changed through time (17,000 BP - present);
   d. Determine how wildlife populations changed with time and what fauna were available to human populations during different Holocene periods;
   e. Determine when and where anadromous fish runs were first established;
   f. Determine what fish species (and corresponding relative abundance) are represented in occupational middens. Discover if species representation varies with time;
   g. Determine how habitats change through time in Southeast Alaska; For example: (1) landscape alteration by beavers; (2) in filling of bays and changing shellfish habitat.

6. Development of Complex Societies:
   a. Determine how complex societies develop in response to the increased abundance, reliability, and predictability of subsistence resources which accompanied stabilization of sea level ca 5,000 BP;
   b. Define how the development of moieties, clans, and other social divisions can be recognized in the archaeological assemblage of the region. Determine if the evolution of these societal concepts can be traced through controlled excavation and structural analysis of a carefully chosen sample of sites;
   c. Determine if contrasts in site structure, reflecting a change from egalitarian gatherer/hunter/fisher to tribal society, are recognizable in the archaeological record;
   d. Determine if burial styles vary through time and if styles and accompanying grave goods reflect a developing social hierarchy.

7. Historical Subsistence:
   a. Define which ecosystems were exploited at different times in the past (i.e., plant and animal remains in sites);
   b. Define the change in the subsistence resource base through time (earliest occupation through present);
   c. Determine if there is an archaeologically recognizable change in social structure (cultural complexity) which correlates with the change in resource base;
   d. Determine if changes in food processing and storage strategies are reflected in archaeological features;
   e. Determine the proportions of shell, fish, bird, sea mammal, and terrestrial mammals represented in middens;
   f. Determine at what seasons sites were occupied.

8. Settlement Patterns:
   a. Determine what site types (villages, fish camps, quarries, mines, fish traps, burials/cemeteries) existed for different periods in time (Paleomarine through historic);
   b. Determine how human population density of various islands has changed through time;
   c. Determine if village demographic and social structure changed through time and from place to place reflecting cultural and environmental diversity;
   d. Determine how internal house layout varies through time and from place to place and if this reflects cultural complexity, differences between culture groups, or adaptation to environmental variables.

9. Rock Art:
   a. Determine if there are design similarities between Southeast Alaska rock art and other culture areas of Alaska and the northwest coast;
   b. Determine if Haida and Tsimshian rock art styles can be distinguished;
   c. Determine if rock art styles and design motifs vary through time;
   d. Determine if pictographs and petroglyphs tend to be associated with other site types.

10. Develop baseline information on cultures and behavioral traditions.

11. Establish baseline information on development of languages.

12. Initiate archival studies (in conjunction with historic thematic overviews).

D. **FACILITIES**

1. Determine the type and location of facilities required to efficiently provide administrative support for Forest management activities.

E. **FIRE**

1. Evaluate changes in vegetative/fuel component(s) and site productivity as a result of the presence of prescribed fire versus areas with prescribed fire absent.

2. Evaluate changes in vegetative/fuels component(s) and site productivity as a result of the non-treatment of activity generated fuels.

3. Evaluate the effects of prescribed fire as it relates to such areas as intensity, duration, scorch height, etc.

F. **FOREST HEALTH**

1. Evaluate incidence and impact of insects and diseases in even-aged young-growth stands.

2. Determine the influence that selection cutting and the retention of wildlife trees will have on the presence, spread, and impact of hemlock dwarf mistletoe.

3. Determine the abiotic factors that cause or contribute to yellow-cedar decline.

4. Identify and resolve problems related to the natural regeneration of yellow-cedar.

5. Evaluate the feasibility of salvaging dead yellow-cedar across the 400,000 acres where cedar decline is known to occur. Determine the volume of salvageable timber.

6. Determine the impact of wood decay fungi on residual trees that are wounded during partial cuts or commercial thinnings.

7. Evaluate bark beetle activity in slash from partial cuts and commercial thinnings.

8. Determine impact due to porcupine damage in managed stands including tree death, bole deformity, growth loss and introduction of wood decay fungi.

G. **KARST AND CAVES**

1. Develop an understanding of the paleoecology and prehistory of Southeast Alaska through studies of the geology, paleontology, and cultural resources within the karst landscape.

2. Determine the relationships between forest regeneration and position in the karst landscape.

3. Document and describe the biospeleology of karst systems.

4. Determine the relationship between karst development and soil erosion within harvested lands.

5. Determine the contribution of karst groundwater systems to productivity of aquatic communities.

6. Determine the influences of forest road construction on sediment and woody debris delivery to karst drainage systems.

7. Evaluate the effects of sediment and woody debris delivered to karst drainage systems on flooding, erosion, and surface discharge.

8. Define the relationship of peatlands to karst development.

9. Analyze the geochemistry of karst host rocks to better understand karst development and identify possible areas suitable for mineral development.

10. Determine differences in productivity of anadromous fish streams draining karst terrain.

H. **MINERALS AND GEOLOGY**

1. Maintain the U.S. Bureau of Land Management mineral resource inventory; create a GIS layer, in cooperation with the U.S. Geological Survey, of undiscovered mineral potential areas.

2. Develop and maintain a Geologic Resource Inventory. Inventories may include mineral material sources, unique geology or paleontology sites, geological hazards, caves, and groundwater resources.

3. Determine the relationship between karst development and forest regeneration rates and soil loss within harvested lands.

I. **OLD-GROWTH FORESTS**

1. Develop a Forest-wide vegetative inventory which allows accurate quantification and mapping of old-growth forest types, based on the 1991 Regional old-growth definitions. (See also Wildlife #2).

2. Document the amount of blowdown, other natural events, and other habitat disturbing activities within old-growth forests.

3. Continue to examine the temporal dynamics of natural disturbances, particularly blowdown, in Southeast Alaska.

4. Prepare a handbook that focuses on considerations of wind damage in managed forest landscapes in Southeast Alaska.

J. **RECREATION**

1. Further develop and apply methods for determining rates of recreation use stratified by activity and for specific locations on the forest.

2. Assess customer satisfaction, and those attributes which contribute to customer satisfaction, of both resident and non-resident recreationists.

3. Evaluate the long-range demand (as assessed in the Plan) for recreation activities, opportunities, and setting preferences.

4. Update and refine the Recreation Places inventory and database.

5. Identify capacities, both physical and social, for Recreation Places consistent with management objectives for the Land Use Designation and Recreational Opportunity Spectrum (ROS) class.

6. Update information on benefits realized by recreationists, and the values of recreation to local and regional economies.

7. Periodically update the Southeast Alaska Pleasure Visitor Research Program. Cooperate with the State and other groups or agencies on conducting recreation or tourism studies.

8. Assess the importance of the tourism, outfitting, and guiding industries, such as numbers of clients, activities, trends, economic values, and relationship to resident recreationists in terms of competition and displacement.

9. Develop information about the effects of landscape modification and forest management activities on residents and tourists, including on the cruise ship and flightseeing industries.

10. Determine differential demand for recreational settings by community.

11. Identify and evaluate possible locations for resort lodges in Southeast Alaska.

K. **RESEARCH NATURAL AREAS**

1. Identify plant and animal communities and features still needing representation in Research Natural Areas.

L. **RIPARIAN**

1. Continue on-the-ground inventories and studies of riparian areas on which to base management actions.

2. Develop a comprehensive study to better understand the need for no-timber-harvest buffers on Class III streams.

3. Determine methods to maintain or enhance riparian associated resources, including intensively developed areas.

M. **RIVERS**

1. Develop wild, scenic, and recreational river information needs as rivers are designated by Congress, and display in the river management plan.

N. **SCENERY**

1. Conduct inventories necessary to implement the new Scenery Management System (SMS). These inventories include:
   a. Work with Area ecologists to identify how ecological land units have been categorized in the Region, and use these to the extent possible to delineate new broad landscape character zones. Develop comprehensive landscape character descriptions for these areas.
   b. Develop new Inherent Scenic Attractiveness ratings using these new ecological land units as a frame of reference. This will in effect refine or replace the Variety Class inventory in the old Visual Management System (VMS).
   c. Refine concern level ratings (sensitivity level ratings in the old VMS) using a constituent analysis as outlined in the new handbook. This analysis can entail a review of all current resident and visitor surveys and the results of scoping efforts, a compilation of Ranger District level and other local knowledge of visitor and resident use patterns and concerns, and possibly additional surveys.
   d. Refine viewshed mapping and delineation of foreground, middleground, and background based on (c) above. This also needs to include mapping viewsheds from level 3 areas.
   e. Using guidelines in the new handbook, combine inherent scenic attractiveness ratings and visibility mapping form (d) above to come up with scenic classes.

2. Using the guidelines in the present Region 10 Visual Management Handbook (which are consistent with direction of the new SMS), create a more accurate Visual Absorption Capability (VAC) inventory to replace the current Forest VAC inventory that was computer derived from other resource information.

3. Continue to update annually the existing visual condition inventory (called Existing Scenic Integrity in the new system) to reflect the new Forest development activities.

4. Map Visual Priority Routes and Use areas and create a layer in GIS.

5. Identify use areas, boat routes, trails, anchorages, etc. in Wilderness areas (all considered Scenic Level I) so that the impacts of proposed development in areas adjacent to Wilderness, and visible from these Wilderness use areas, may be more easily assessed.

O. **SOCIAL AND ECONOMIC**

1. Study the potential influence on forest management resulting from the establishment of additional value-added forest products-processing industries into Southeast Alaska.

2. Develop and maintain a community-level database of available statistics which have been collected by State and Federal agencies. Make the database available for project level planning. (This item coincides, in part, with priority research item #2.)

3. Obtain employment and income information for the salmon harvesting and seafood processing industries. Develop employee ratios based on the information obtained.

4. Accurately determine the percentage of Southeast Alaska's salmon harvest resulting from the Tongass National Forest, and the associated harvesting and processing employment.

5. Accurately determine the percentage of Southeast Alaska's tourism and recreation resulting from the Tongass National Forest. Include viewing scenery of the Tongass in the calculations.

6. Identify and measure local, regional, and national values associated with the existence of Southeast Alaska resources and settings (apart from values associated with direct use of those resources and settings).

7. Better understand the human dimensions of natural resource decisions, allocations, and regulations in Southeast Alaska.

P. **SOIL AND WATER**

1. Conduct a systematic review of existing soil and water related data available for the Forest.

2. Continue to obtain soil and water baseline data to assess land-disturbing activities on soils (e.g. productivity, erosion), water quality and quantity, and sediment yield.

3. Conduct Watershed Condition Surveys to determine improvement needs as part of the development of the watershed improvement plan.

4. Determine whether native or non-native seed mixtures are more useful for erosion control and for wildlife forage plantings. Determine if non-native seed mixtures invade and threaten any native species or the function of natural ecosystems.

5. Develop and validate cumulative watershed effects models.

6. Develop a scientifically based, cost effective, issue driven watershed analysis protocol. This protocol should be designed to provide methods and procedures for linking watershed analyses with broader level landscape analyses to provide for effective integrated management at multiple scales.

7. Determine appropriate or allowable development and forest uses in municipal watersheds.

Q. **THREATENED, ENDANGERED, AND SENSITIVE SPECIES**

1. Continue to expand the knowledge base on the distribution, life-history, genetics, habitat requirements, populations, and population trends of the threatened, endangered, and sensitive species, as well as candidate species. Priority for obtaining this information is as follows:
   a. Endemic terrestrial species considered most sensitive to forest management activities;
   b. Other terrestrial species most sensitive to forest management activities;
   c. Fresh water aquatic species considered most sensitive to forest management activities (including anadromous fish species);
   d. Marine species which utilize upland forest habitats for a portion of their habitat needs;
   e. Other marine species affected primarily by activities in the marine environment. The threatened and endangered species information gathering will use National Marine Fisheries Service and U.S. Fish and Wildlife Service Recovery Plans as guidance, as they are developed.

2. Evaluate levels of lead in habitat areas, and effects on trumpeter swan populations.

R. **TIMBER**

1. Conduct an existing vegetation inventory for the entire Forest every 10 to 15 years. Timber attributes will be derived from this integrated inventory.

2. Complete inventories of forested plant associations.

3. Assess areas that have received precommercial thinning or release and weeding treatments to insure management objectives have been met.

4. Design and evaluate methods to provide for windfirm timber harvest areas, especially in the vicinity of riparian areas. Determine whether feathering of clearcut edges increases the windfirmness of the uncut stand.

S. **TRANSPORTATION**

1. Maintain an inventory of all Forest development transportation facilities including roads, bridges, and major culverts, log transfer facilities, and airfields.

T. **WILDERNESS**

1. Develop information on direct effects of human activity on wilderness ecosystems, including the effect of wildlife viewing activities on wildlife use and behavior.

2. Continue and expand ongoing ecological studies, such as lichen research, migratory bird use, and brown bear population dynamics.

3. Study effects of frequent aircraft over-flights on primitive recreation settings.

4. Develop information on the amount and location of recreation, subsistence, and other uses in wilderness.

5. Develop information on customer satisfaction (see also Recreation Information Needs).

6. Identify indicators and establish Limits of Acceptable Change (LAC) for designated Wilderness areas.

U. **WILDLIFE**

1. Work towards a Forest-wide habitat inventory program to accomplish the following objectives:
   a. Obtain and establish "baseline" habitat conditions in important habitat areas;
   b. Provide documentation of natural and/or modified habitat conditions;
   c. Identify opportunities for management actions which will help maintain or improve habitats;
   d. Identify corridor requirements (if they exist) for mobility; and,
   e. Develop a better understanding of wildlife viability on the Tongass.

   Important habitats are: marine mammal haul outs, old-growth conifer habitats, Regional sensitive species habitats, marine bird rookeries and colonies, important seasonal habitats and concentration areas for the Management Indicator Species, and moose habitats. Coordinate the inventory work with other appropriate agencies and institutions.

2. Inventory vegetative conditions in moose habitat areas to help identify short and long-term changes in habitat conditions; identify the relationship of these habitat changes to moose population trends; assess the effects of various management activities in changing habitat conditions and moose populations. (May be in conjunction with item #1).

3. Identify opportunities for management actions which will help maintain or improve habitats for:
   a. Important waterfowl;
   b. Marine mammals (e.g., haulouts);
   c. Introduced elk;
   d. Marine bird rookeries and colonies;
   e. Important seasonal habitats for Management Indicator Species.

4. Cooperate with other agencies and institutions to inventory the geographic distribution of small mammals, birds, and herpetofauna throughout the Forest (to increase our understanding of the island biogeography of Southeast Alaska) (work currently underway through priority research item #5).

5. Obtain information on snow-pack conditions, Forest-wide, within second-growth and old-growth timber stands. The objectives of this are:
   a. To gain a better understanding of the influence of stand age and canopy closure on snow interception; and,
   b. To assess snow accumulation on winter ranges to obtain a Forest-wide index of winter conditions.

6. Continue to assess the second-growth management program and methods to enhance second-growth habitat conditions for wildlife.

7. Determine effectiveness of wildlife enhancement projects, in terms of habitat capability and populations or population trends.

8. Continue to obtain information on the distribution, life history, genetics, habitat requirements, populations, and population trends of hawks, owls, and murrelets, with special emphasis on those species associated with old-growth forests. Develop protocol and inventory standards (Forest Service is currently funding studies on the Queen Charlotte goshawk and the marbled murrelet).

9. Continue to obtain information on the effectiveness of old growth stands of various sizes to provide for wildlife habitat. Questions to ask include:
   a. What species are associated with various stand sizes?
   b. How do you measure and assess the effects of fragmentation?
   c. What is the function and value of edge between old growth stands and younger successional stages?

10. Obtain information on whether individual trees, snags, or clumps of trees retained within clearcuts provide useful wildlife habitat, and for what period of time. Assess the percent of clumps that blow over.

11. Determine whether wintering bird and breeding bird populations vary over the long-term.

12. Determine whether roads and the human use of roads affect: old-growth habitat ecosystems; the usefulness of old-growth blocks to dependent wildlife; and the value of forested corridors designed to provide wildlife/landscape connectivity between blocks of old-growth habitat.

13. Replicate the Southeast Alaska murrelet sea survey.

14. Determine the current status, habitat distribution and habitat needs for the spotted frog.

15. Determine the upland habitat use by marbled murrelets (Forest Service is currently funding marbled murrelet research).

16. Expand baseline information on neotropical migratory bird species habitat distribution and relative abundance.

17. Continue and expand wolf research to include effects of forest management on deer populations through proximate influences on forage quality and availability and ultimate effects on deer demography and population dynamics.

18. Intensify efforts to determine goshawk habitat relationships with emphasis on determining habitat needs of key prey species (Forest Service is currently funding studies on the Queen Charlotte goshawk).

19. Develop and expand waterfowl research to:
    a. Establish baseline populations for Vancouver Canada Goose and trumpeter swans wintering in Southeast Alaska;
    b. Establish baseline population for sea ducks and other waterbirds wintering and breeding in Southeast Alaska;
    c. Identify, locate, and map in a GIS significant molting areas of Vancouver Canada geese;
    d. Determine critical food resources for wintering sea ducks and identify potential significant problems;
    e. Determine critical food resources for wintering, breeding, and molting Vancouver Canada geese and identify potential significant problems;
    f. Determine seasonal habitat distribution and critical food resources for harlequin ducks and identify any potential significant problems;
    g. Determine habitat distribution and relative abundance and habitat and food requirements of migrating (spring and fall) snow geese, swans (trumpeter and tundra), and pacific brants and identify any potential significant problems;
    h. Determine habitat distribution and relative abundance and habitat and food requirements for migrating sandhill cranes and identify any potential significant problems.

20. Determine the effectiveness of forested corridors of various ecological characteristics and sizes in providing landscape connectivity. Determine the role of forested corridors in providing for viable populations (well distributed) of old-growth associated species. (Note: there may be overlap with Wildlife Information Needs #1 and #12.)

21. Determine marten habitat relationships, particularly the role of down material and of large standing live and dead trees at the stand scale. Examine the contribution of forest structure retained within harvest units and its role in facilitating marten movement and dispersal.